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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of: John S. Lee et al.

Title: COMPACT DISC HANDLER AND ORGANIZER

Attorney Docket No.: 510.030US1

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PATENT APPLICATION TRANSMITTAL

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- a) the owner of the small business concern identified below:
- b) an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN: Rimage Corporation
ADDRESS OF CONCERN: 7725 Washington Avenue South
Edina, MN 55439

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 C.F.R. 121.3-18, and reproduced in 37 C.F.R. 1.9(d), for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled MEDIUM HANDLER AND ORGANIZER by inventors John S. Lee, David J. Suden, Westin W. Nelson, Phillip C. Salisbury and Darrin William Piekkola described in the specification filed herewith.

If the rights held by the above-identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below* and no rights to the invention are held by any person, other than the inventor, who could not qualify as an independent inventor under 37 C.F.R. 1.9(c) or by any concern which would not qualify as a small business concern under 37 C.F.R. 1.9(d) or a nonprofit organization under 37 C.F.R. 1.9(e). *NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 C.F.R. 1.27)

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SIGNATURE Robert M. Wolf DATE 2/8/00

Medium Handler and Organizer

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Technical Field of the Invention

The present invention relates generally to storage medium processing and in particular the present invention relates to a medium handler and organizer.

Background of the Invention

10 Compact discs are used as a storage medium for digital information. The data is stored on the compact disc by varying the optical characteristics of the disc. This digital information can be any type of data, such as, but not limited to, audio, image, photo and/or video information. In other words, the digital data stored on a compact disc can vary from disc to disc. Different types of compact discs can be provided, a traditional

15 type of compact disc is manufactured using a plastic mold operation. Each compact disc manufactured using the same mold contains the same digital information. As such, large production runs of compact discs which contain the same information, such as a musical composition, are manufactured in an economical manner by using a molding process.

20 A different type of compact disc which is commercially available is a recordable compact disc. This type of disc is manufactured such that it does not contain data thereon, but can be programmed after it is manufactured. The optical characteristics, therefore, of the compact disc are modified after it is fabricated depending upon the data that is stored on the disc. In the context of the present invention, it is to be understood
25 that reference to a compact disc (CD) includes and encompasses Compact Disc Recordable “CD-R”, Compact Disc Readable “CD-RW”, CD-ROM, CD-PROM, Digital Versatile Disc “DVD”, DVD-R, DVD-RAM, DVD-RW, or any disc for data storage.

30 To identify the data stored on a compact disc, a label is often printed on one side of the compact disc. For large manufacturing runs of a common compact disc, a

silk screen process is often used to apply the label to the compact disc. For small production runs of compact discs, such as those using recordable compact discs, a silk screen operation may not be economical. A custom printing operation, therefore, can be employed to print a custom label on each compact disc. See for example U.S. Patent 5 No. 5,734,629 entitled "CD Transporter" issued March 31, 1988 for a description of a compact disc transporter which can be used to move a compact disc between a data recorder and a printer. This transporter moves a single compact disc at a time between stations and places completed compact discs in a stack.

For the reasons stated above, and for other reasons stated below which will 10 become apparent to those skilled in the art upon reading and understanding the present specification, there is a need in the art for the compact disc handling apparatus and method which more efficiently transports compact discs between stations and provides easy access to pre-determined compact discs which have been processed.

15 Summary of the Invention

The above mentioned problems with medium handling devices and other problems are addressed by the present invention and will be understood by reading and studying the following specification.

In one embodiment, a compact disc processing system comprises a printer for 20 printing indicia on a first compact disc, a recorder for recording information on the first compact disc, and a transporter carriage for holding the first compact disc and moving the first compact disc between the recorder and printer. The transporter carriage comprises a rotatable gripping head having first and second gripping locations each for respectively holding the first and a second compact disc simultaneously.

25 In another embodiment, the system further includes a compact disc organizer. The organizer comprises a plurality of disc trays, and a selection mechanism coupled to the plurality of disc trays for selectively moving the plurality of disc trays such that the first compact disc can be placed on the selected disc tray for temporary storage.

Other embodiments are described herein, and it is manifestly intended that this invention be limited only by the claims and the equivalents thereof.

5

Brief Description of the Drawings

Figure 1 illustrates a block diagram of a compact disc handler of the present invention;

Figure 2 illustrates a detailed diagram of a compact disc handler of the present invention;

10 Figure 3 is a gripping head of the compact disc handler of the present invention;

Figure 4 illustrates the gripping head of Figure 3 holding two discs;

Figures 5 and 6 illustrate one embodiment of a disc organizer of the compact disc handler of the present invention;

15 Figure 7 illustrates one embodiment of an alignment feature of the present invention; and

Figures 8A and 8B provide cross-section views of the alignment feature of Figure 7.

Detailed Description of the Invention

20 In the following detailed description of the preferred embodiments, reference is made to the accompanying drawings which form a part hereof, and in which is shown by way of illustration specific preferred embodiments in which the inventions may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments 25 may be utilized and that logical, mechanical and electrical changes may be made without departing from the spirit and scope of the present invention. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present invention is defined only by the claims.

Referring to Figure 1, a simplified block diagram is illustrated of one embodiment of a compact disc handler 100 of the present invention. The block diagram is provided to help understand the relationship of components in embodiments of the invention, and a detailed description of embodiments of the components are described below. The compact disc handler includes at least one compact disc recording device 102, a printer 104 for printing label-type information on a compact disc, a transporter device 106 for moving compact discs, and an optional disc organizer 108. The recorder can be any type of commercially available recorder intended to record data on an optically readable medium, such as a compact disc. Likewise, the printer can be any type of printer intended to print information or images on a compact disk. The printer can operate using any known printing method, such as but not limited to thermal transfer, ink jet or laser printing. As described in greater detail below, the transporter device includes a gripping head 110 which can selectively pick up a compact disc. The gripping head has the ability to grip more than one compact disc at a time to increase the number of compact discs which can be processed over a given period of time. Also explained in greater detail below, is the disc organizer which allows for the easy storage and retrieval of compact discs.

Referring to Figure 2, one embodiment of a compact disc handler 200 is described in greater detail. The compact disc handler includes at least one printer 102 which has an extendable drawer that is adapted to receive a compact disc. That is, the drawer extends to an open position to allow a compact disc to be placed in the drawer. The drawer can retract into the printer so that a label or other image can be printed on the compact disc. In one embodiment, an optional second printer 140 can be provided. The handler also includes one or more data recorders 104. Like the printer, each recorder has an extendable drawer which is adapted to receive a compact disc. In one embodiment, some of the recorders can be vertically aligned such that their respective drawers are in substantial alignment when they are in their extended positions.

The compact disc handler includes at least one compact disc station 210. In one embodiment, the station includes a vertically extending rod which is sized to fit within a

central opening provided in the compact discs. As known to those skilled in the art, commercially available compact discs have a circular central opening. As such, compact discs can be stacked in axial alignment by placing them over the vertical rod. Numerous compact disc stations can be provided, and the present invention is not

5 limited to a particular number of stations. For example, the compact disc handler can include two compact disc supply stations for providing unrecorded compact discs, and a station for stacking completed (recorded and printed) compact discs. In another embodiment, a compact disc station can be provided for collecting compact discs which are rejected during processing.

10 The compact disc handler includes a compact disc transporter mechanism 202. The compact disc transporter includes a pickup arm 206 and a gripping head 230. The transporter mechanism also includes a vertically extending shaft(s) 235. The pickup arm is coupled to the shaft to allow the pickup arm to move in the vertical direction during operations. As such, the transporter mechanism includes a motor to provide

15 vertical movement to the pickup arm. In one embodiment, shaft 235 can be formed with a concentric interior and exterior shafts that engage the pickup arm. The interior shaft is rotated to either raise or lower the pickup arm, and the exterior shaft is rotated to rotate the pickup arm through a horizontal plane around an axis of the vertically extending shaft. As illustrated in Figure 2, this allows the gripping head to be vertically aligned

20 with the drawers of the printer and recorders, and also vertically aligned with the compact disc stations. In alternate embodiments, different gear structures can be used, including a belt and pulley configuration.

Prior compact disc transporter devices were designed to pickup a single compact disc and transport it to the recorder for storing data thereon. After data is stored on the

25 compact disc, the transporter moves the compact disc from the recorder to the printer. While the compact disc was in the printer the transporter could pick up a blank compact disc and place it in the recorder. In other words, prior compact disc transporters worked in a serial manner. The amount of time used by the transporter mechanism can be relatively significant. The present invention reduces this time by providing a transporter

mechanism which can grip two, or more, compact discs at one time. As explained in greater detail below, the transporter can select a blank compact disc, pickup a compact disc from the recorder and replace it with the blank compact disc without delaying recording while the transporter returns to a supply station. The amount of time,
5 therefore, which was needed to move the transporter can be absorbed by other processing operations to improve the overall operating efficiency of the compact disc handler.

One embodiment of pickup arm 206 and gripping head 230 are illustrated in Figure 3. The gripping head is designed to hold up to two discs 260 and 270 (see Figure
10 4)using vacuum mechanisms. The gripping head is also designed to allow the rotation 280 of at least one disc about its central axis. Other gripping mechanisms are contemplated for gripping compact discs, such as mechanical fingers which grab a central opening of the compact discs. As such, the present invention should not be limited to a vacuum controlled gripping head. For example, the outside diameter of the
15 disc can be used to grip the disc.

A wrist motor 290 may be included in the pickup arm for rotating 292 the gripping head and end portion 300 of the arm attached to the gripping head. This motion allows for a horizontal rotation about an axis of the arm. A vacuum pump 310 can be included in the pickup arm for selectively activating a vacuum(s) to pick up
20 discs. It will be appreciated that the vacuum can be located anywhere in the system and is not limited to the location described. The gripping head can hold a compact disc with sufficient force to allow for a controlled rotation of the compact disc about its axis, as explained below, for assistance in the printing operation.

One side of the gripping head includes an alignment feature 315 which assists in
25 maintaining axial alignment between the gripping head and a compact disc 260. This feature also assists in alignment for sensors to detect an index mark, as explained below. This alignment feature can be provided on both sides, but is limited to one side in this embodiment. The alignment feature includes a plurality of deflectable fingers which extend from the gripping head. During operation, the fingers extend into a central

opening provided in the discs. This feature is helpful in maintaining accurate placement of a compact disc in the printer, which can be important for accurate printing.

It will be appreciated by those skilled in the art, that a subsequent personalized image, or indicia, printed on the top surface of the compact disc may be printed in an area which does not include preprinted information. That is, if this subsequent printed indicia occupies the same location as preprinted indicia, the composite image could be visually undesirable, if not unreadable. It may, however, be desirable to print a subsequent image over a prior image. The pre-printed image may include a background field which provides a visual contrast for subsequently printed material. To insure proper positioning relative to pre-printed material, the rotational position of the disc and/or the pre-printed image can be controlled by rotating the gripping head, as explained above.

A photo-optical sensor (not shown) can be used to detecting an image located on the compact disc, such as printed images or an index mark, see U.S. Patent Application Serial No. 08/944,315, filed 10/06/1997 entitled "COMPACT DISC PRINTING SYSTEM AND METHOD" and incorporated herein. Alternately, the sensor can be a camera positioned in a location having a field of view of the compact disc. Other sensing devices known to those skilled in the art are also contemplated.

In operation, the gripper head allows for processing of multiple compact discs at one time. Prior processing techniques transported a blank compact disc to a recorder, after data had been written to the disc, the compact disc was moved to a printer to receive a label. After the compact disc was moved to the printer, the transporter moved to a compact disc supply to pick up a new blank disc to be placed in the recorder. As stated above, the steps of retrieving a new disc slows the processing down. It will be appreciated by those skilled in the art with the benefit of the present detailed description that maintaining active recorders can increase processing volume. That is, reducing the amount of time that a compact disc is not in a recorder and/or printer can increase production volumes.

The present invention reduces inactive recorder time by having a new blank compact disc available when recording is completed on a prior disc. In operation, gripper head 230 is moved to a supply location 210 while the recorder is busy. A new disc is picked up by gripper 232 of gripper head 230, the gripper head moves to the 5 recorder, and the gripper head is rotated 180 degrees about a horizontal axis so that open gripper 231 of gripper head 230 is staged above the drawer of the recorder. When the recorder is completed and the drawer extends to an open position, gripper 231 then picks up the recorded disc from the drawer. The gripper head then rotates 180 degrees and places the blank disc in the recorder drawer. The gripper head can then remove a 10 printed disc from the printer using open gripper 232 and replace it with the recorded disc from gripper 231. By allowing for movement of two discs simultaneously, the present invention reduces the amount of time that either the printer or recorder are waiting for the gripper head to move between disc locations. The gripper head can be rotated at any time after a disc has been gripped. That is, the gripper head can rotate 15 simultaneously with movement of the arm.

It will be appreciated that the order of operation can be changed without departing from the present invention. As such, a label can be printed on a disc and then the disc can be placed in a recorder. In operation, gripper head 230 is moved to a supply location 210 while the printer is busy. A new disc is picked up by gripper 232 of 20 gripper head 230, the gripper head moves to the printer, and the gripper head is rotated 180 degrees about a horizontal axis so that open gripper 231 of gripper head 230 is staged above the drawer of the printer. When the printer is completed and the drawer extends to an open position, gripper 231 then picks up the printed disc from the drawer. The gripper head then rotates 180 degrees and places the blank disc in the printer 25 drawer. The gripper head can then remove a recorded disc from the recorder using open gripper 232 and replace it with the printed disc from gripper 231.

One embodiment of the present invention can include a disc verifier or data reader. The verifier can be used to check data written to a disc medium for accuracy. This feature can be incorporated into the above described system and process. A reader

can be used to read or extract data from the disc. Such data may be used to further process the disc. For example, a disc may contain label information to instruct the printer. Further, a disc may contain information indicating what additional data needs to be recorded on the disc. Thus, the present invention can be used to perform different operations on a data medium in any number of different sequences.

Disc organizer 220 is illustrated generally in Figures 5-6. Figure 5 shows a front perspective view and Figure 6 shows a side perspective view. The organizer can be used as either a library of original discs, or as a location to hold completed discs which need to be retrieved. Figure 6 has been simplified to illustrate the teeth on the disc trays and does not illustrate a gear assembly used to engage the tray.

In one embodiment, the organizer has a plurality of trays 350 which can each hold a compact disc. The trays include a set of teeth 352 located at one end of arm 353. The teeth of a tray can be selectively engaged to allow the tray to rotate about shaft 360. Dual concentric shafts 364 (inner shaft not shown) are provided for selecting a disc and rotating it to one of several positions. The first position (A), Figure 5, is a storage position where the discs are libraried. The second position (B) is an extended position to allow a user to easily access a disc located on the tray. The third position (not shown) is an intermediate position that is accessible by the gripper head 230. The second and third positions can be combined into one position in some embodiments.

The dual concentric shafts 364 are used to selectively couple one of the trays and rotate it to an extended position via teeth 352. In one embodiment, the inner shaft vertically moves a corresponding gear assembly to engage the teeth of a tray. The inner shaft is moved by servo motor 370. When the tray has been engaged, the outer shaft 364 is rotated by servo motor 375 to place the tray in a selected position. It will be appreciated that other embodiments can be practiced without departing from the present invention.

In operation, one of the trays is extended so that the gripper head 230 can either place a disc in, or retrieve a disc from the tray. Because processed compact discs are stacked together on shaft 211 (Figure 2), a specific processed disc can be difficult to

retrieve out of order. These discs can be identified during processing and placed in a tray 350 when processing is completed. A user can then retrieve the compact disc by selecting the appropriate tray. Likewise, compact discs which store master copies of data or programs can be libraried in the trays for retrieval and use by the transporter.

- 5 Again, one skilled in the art with the benefit of the present description can design numerous mechanical embodiments, and the present invention is not limited to the embodiments described herein.

Figure 7 illustrates one embodiment of alignment feature 315 of the present invention. The alignment feature includes a number of inwardly sloping tabs 360 that fit in a central opening of a compact disc. The tabs thereby center the disc. Figures 8A and 8B provide cross-section views of the alignment feature of Figure 7. Figure 8A shows the tabs in an un-deflected state. The tabs are flexible such that they can be deflected when shaft 211 passes through gripping head 230.

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Conclusion

A compact disc processing system has been described which allows for more efficient processing of compact discs. The system included a transporter mechanism that can grip and transport more than one compact disc at a time. As such, a second disc 20 can be gripped while a first disc is being processed. This eliminates the need to wait for processing operations, such as recording or printing, to be completed prior to transporting the second disc. A disc organizer has also been described which includes trays that can be used to store discs for selective retrieval. The organizer eliminates the difficulty encountered in locating a processed disc from a large stack of discs.

25 Although specific embodiments have been illustrated and described herein, it will be appreciated by those of ordinary skill in the art that any arrangement which is calculated to achieve the same purpose may be substituted for the specific embodiment shown. This application is intended to cover any adaptations or variations of the present

invention. Therefore, it is manifestly intended that this invention be limited only by the claims and the equivalents thereof.

What is claimed is:

1. A compact disc processing system comprising:
 - a printer for printing indicia on a first compact disc;
 - 5 a recorder for recording information on the first compact disc; and
 - a transporter carriage for holding the first compact disc and moving the first compact disc between the recorder and printer, the transporter carriage comprises a rotatable gripping head having first and second gripping locations each for respectively holding the first and a second compact disc simultaneously.

10

2. The compact disc processing system of claim 1 wherein the transporter carriage holds the first and second compact discs using a vacuum.
- 15 3. The compact disc processing system of claim 1 wherein the rotatable gripping head can rotate about a horizontal axis.

4. The compact disc processing system of claim 1 wherein the transporter carriage is moveable in both a horizontal and a vertical direction.
- 20 5. The compact disc processing system of claim 1 further comprising a compact disc organizer comprising:
 - a plurality of disc trays; and
 - a selection mechanism coupled to the plurality of disc trays for selectively moving the plurality of disc trays such that the first compact disc can be placed on the selected disc tray for temporary storage.
- 25

6. The compact disc processing system of claim 1 further comprising a supply location having a vertically extending rod sized to fit within a central opening provided in the first compact disc.

7. The compact disc processing system of claim 1 wherein the gripping head includes a motor for selectively rotating the first compact disc about its axis.

8. The compact disc processing system of claim 1 wherein the first and second gripping locations are located on opposite sides of the gripping head and can selectively hold the first and second compact discs using a vacuum.

9. A compact disc processing system comprising:
a supply station for holding a plurality of blank compact discs;
10 a printer for printing indicia on a first compact disc, the printer includes an extendable draw adapted to receive the first compact disc;
a recorder for recording information on the first compact disc, the recorder includes an extendable draw to receive the first compact disc; and
a transporter carriage for simultaneously holding the first and a second compact
15 discs, the transporter carriage is moveable in both vertical and a horizontal directions to place and pick up the first compact disc from the drawers of both the recorder and printer, the transporter carriage is moveable in both vertical and a horizontal directions to pick up one of the plurality of blank compact discs held at the supply location,
the transporter carriage comprises a pickup arm and a gripping head attached to
20 one end of the pickup arm, the gripping head has first and second gripping locations each for respectively holding the first and second compact discs simultaneously, and the gripping head is rotatable about a horizontal axis of the pickup arm.

10. The compact disc processing system of claim 9 wherein the supply location
25 includes a vertically extending rod sized to fit within a central opening provided in the plurality of blank compact discs.

11. The compact disc processing system of claim 9 further comprising a compact disc organizer comprising:

a plurality of disc trays; and
a selection mechanism coupled to the plurality of disc trays for selectively moving the plurality of disc trays such that the first compact disc can be placed on the selected disc tray for storage.

5

12. The compact disc processing system of claim 9 wherein the first and second gripping locations are located on opposite sides of the gripping head and can selectively hold the first and second compact discs using a vacuum.
- 10 13. The compact disc processing system of claim 9 wherein the first gripping location includes a centering feature to axially align the first compact disc with the first gripping location.
14. A method of operating a disc processing system comprising a printer for printing indicia on a compact disc, a recorder for recording information on the compact disc, and a transporter carriage for simultaneously holding at least two compact discs, the method comprising:
gripping a first compact disc with the transporter carriage;
moving the transporter carriage to the recorder and placing the first compact disc
20 in the recorder;
moving the transporter carriage to a supply location and gripping a second compact disc with the transporter carriage while the first compact disc is in the recorder;
removing the first compact disc from the recorder with the transporter carriage,
such that the transporter carriage simultaneously grips both the first and second compact
25 discs;
placing the second compact disc in the recorder after the first compact disc has been removed; and
moving the transporter carriage to the printer and placing the first compact disc in the printer.

15. The method of claim 14 wherein the transporter carriage includes a gripping head having first and second grippers for gripping the first and second compact discs.

16. The method of claim 14 wherein the first compact disc is rotated about its axis to
5 a predetermined rotational position prior to placing the first compact disc in the printer.

17. The method of claim 14 further comprising:
removing the first compact disc from the printer;
selectively extending a tray of a compact disc organizer; and
10 placing the first compact disc in the extended tray for subsequent removal by a user.

18. A method of operating a disc processing system comprising a printer for printing indicia on a compact disc, a recorder for recording information on the compact disc, and
15 a transporter carriage for simultaneously holding two compact discs, the method comprises in the order of:

gripping a first compact disc with the transporter carriage;
moving the transporter carriage to the recorder and placing the first compact disc in the recorder;
20 moving the transporter carriage to a supply location and gripping a second compact disc with the transporter carriage while the first compact disc is in the recorder;
removing the first compact disc from the recorder with the transporter carriage,
such that the transporter carriage simultaneously grips both the first and second compact discs;
25 placing the second compact disc in the recorder after the first compact disc has been removed; and
moving the transporter carriage to the printer and placing the first compact disc in the printer.

19. A method of operating a disc processing system comprising a printer for printing indicia on a compact disc, a recorder for recording data on the compact disc, and a transporter carriage for simultaneously holding at least two compact discs, the method comprising:

5 either recording data on a first compact disc using a recorder, or printing indicia on the first compact disc with the printer; and

gripping a second compact disc using the transporter carriage while the first compact disc is located in either the recorder or the printer.

10 20. The method of claim 19 further comprises removing the first compact disc from the recorder or printer with the transporter carriage while simultaneously gripping the second compact disc.

15 21. A method of operating a disc processing system comprising a printer for printing indicia on a compact disc, a recorder for recording information on the compact disc, and a transporter carriage for simultaneously holding at least two compact discs, the method comprising:

gripping a first compact disc located in the printer with the transporter carriage;
removing the first compact disc from the printer;

20 moving the transporter carriage to the recorder and gripping a second compact disc located in the recorder with the transporter carriage;

removing the second compact disc from the recorder;
placing the first compact disc in the recorder; and
moving the transporter carriage to the printer; and

25 placing the second compact disc in the printer.

22. A method of operating a disc processing system comprising a printer for printing indicia on a compact disc, a recorder for recording information on the compact disc, and

a transporter carriage for simultaneously holding at least two compact discs, the method comprising:

- gripping a first compact disc located in the recorder with the transporter carriage;
- removing the first compact disc from the recorder;
- 5 moving the transporter carriage to the printer and gripping a second compact disc located in the printer with the transporter carriage;
- removing the second compact disc from the printer;
- placing the first compact disc in the printer; and
- moving the transporter carriage to the recorder; and
- 10 placing the second compact disc in the recorder.

23. A method of operating a disc processing system comprising a recorder for recording data on the compact disc, and a transporter carriage for simultaneously holding at least two compact discs, the method comprising:

- 15 gripping a first compact disc located in the recorder with the transporter carriage;
- removing the first compact disc from the recorder; and
- placing a second compact disc in the recorder without releasing the first compact disc or moving the transporter carriage from the recorder to a compact disc supply location.

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24. A method of operating a disc processing system comprising a printer for printing indicia on a compact disc, and a transporter carriage for simultaneously holding at least two compact discs, the method comprising:

- gripping a first compact disc located in the printer with the transporter carriage;
- 25 removing the first compact disc from the printer; and
- placing a second compact disc in the printer without releasing the first compact disc or moving the transporter carriage from the printer to a compact disc supply location.

25. A method of operating a disc processing system comprising a processing station to perform a processing operation on a compact disc, and a transporter carriage for simultaneously holding at least two compact discs, the method comprising:

gripping a first compact disc located in the processing station with the
5 transporter carriage;

removing the first compact disc from the processing station; and
placing a second compact disc in the processing station without releasing the
first compact disc or moving the transporter carriage from the processing station to a
compact disc supply location.

10

26. The method of claim 25 wherein the processing station is elected from the group comprising a printer to print on the compact disc, a recorder to record data on the compact disc, a verifier to verify data recorded on the compact disc and a reader to read data stored on the compact disc.

15

Abstract of the Disclosure

A compact disc processing system allows for more efficient processing of compact discs. The system included a transporter mechanism that can grip and transport more than one compact disc at a time. As such, a second disc can be gripped while a
5 first disc is being processed. This eliminates the need to wait for processing operations, such as recording or printing, to be completed prior to transporting the second disc. The system includes a gripping head with at least two vacuum controlled mechanisms for selectively gripping the discs. A disc organizer can be provided which includes trays that can be used to store discs for selective retrieval. The organizer eliminates the
10 difficulty encountered in locating a processed disc from a large stack of discs.

15

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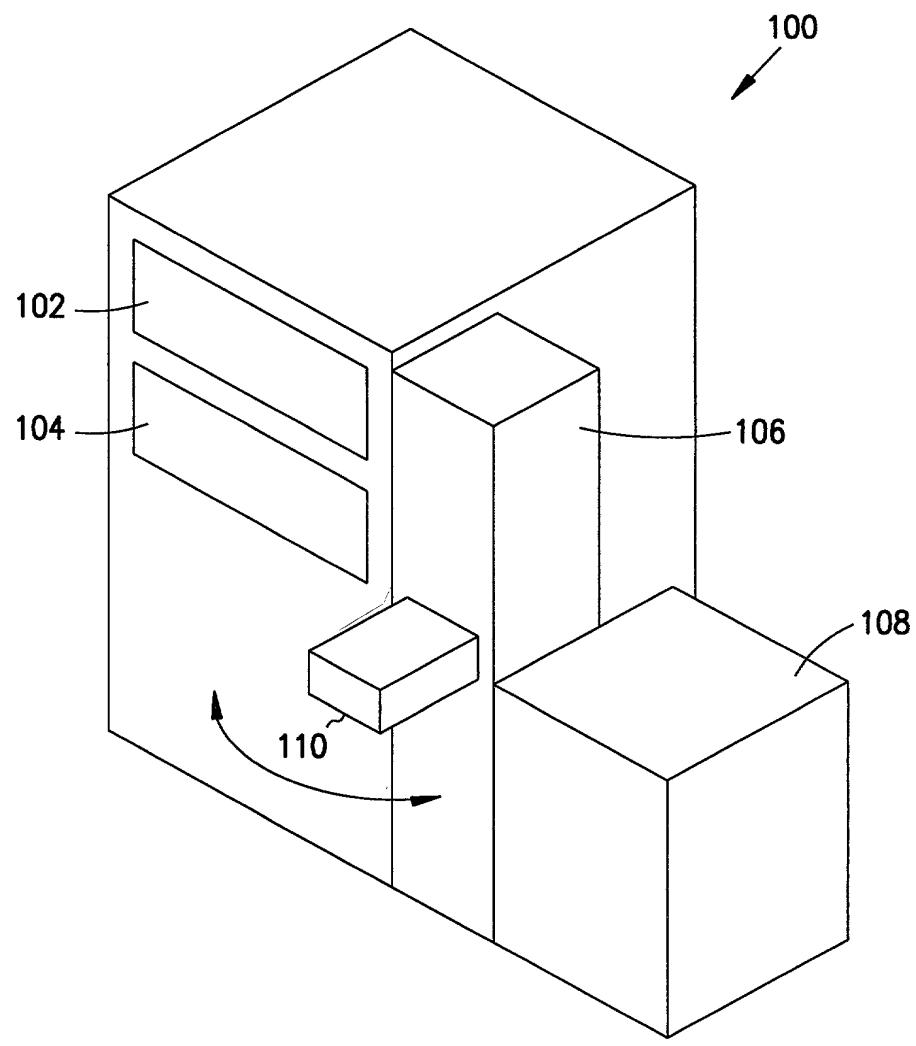


FIG. 1

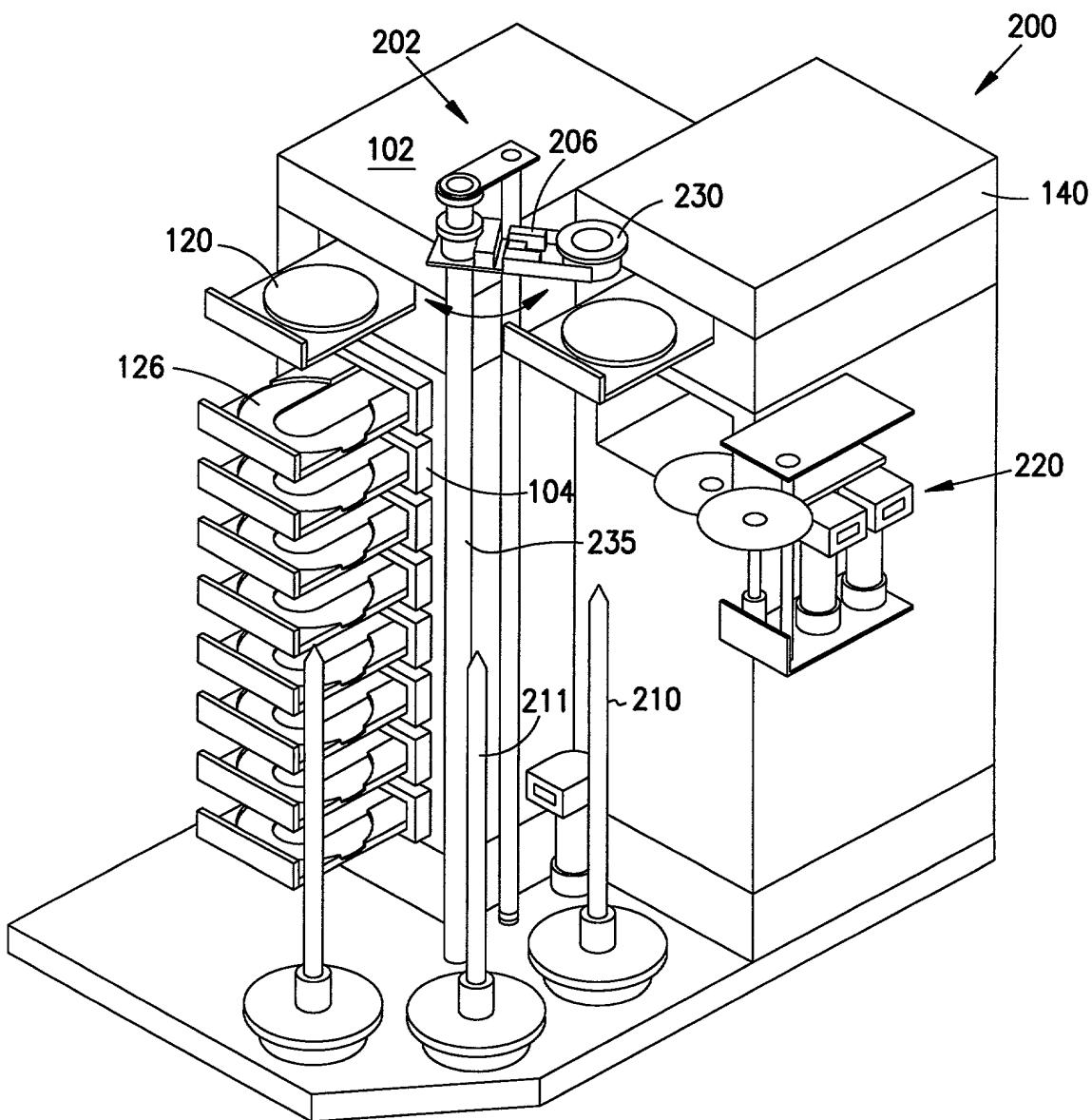


FIG. 2

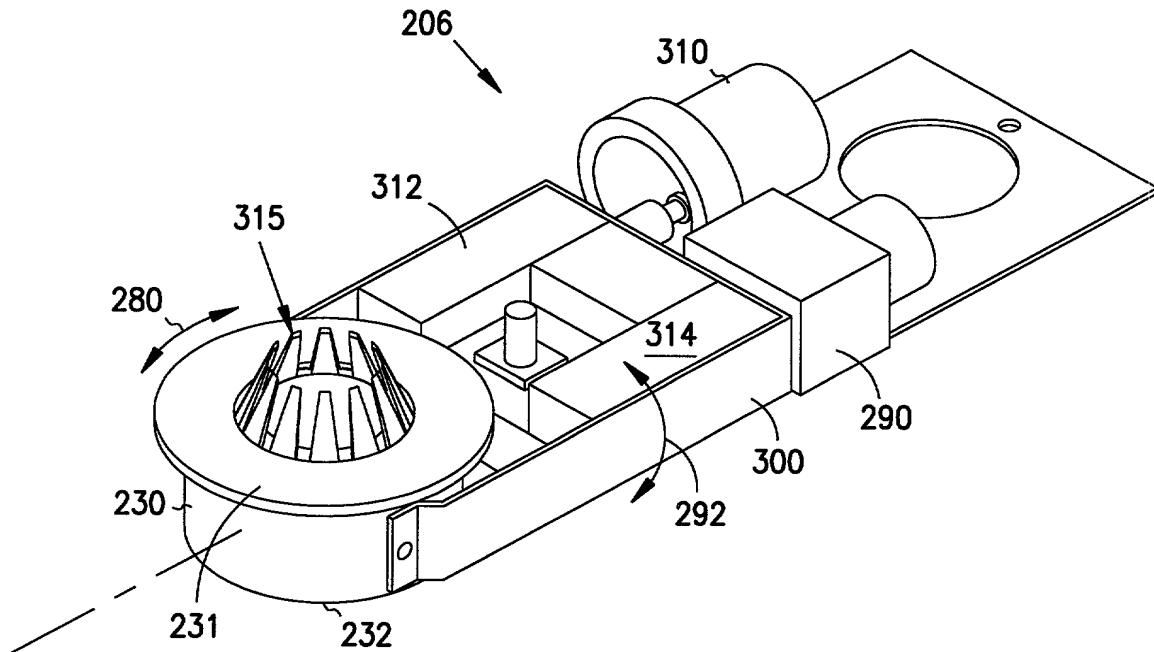


FIG. 3

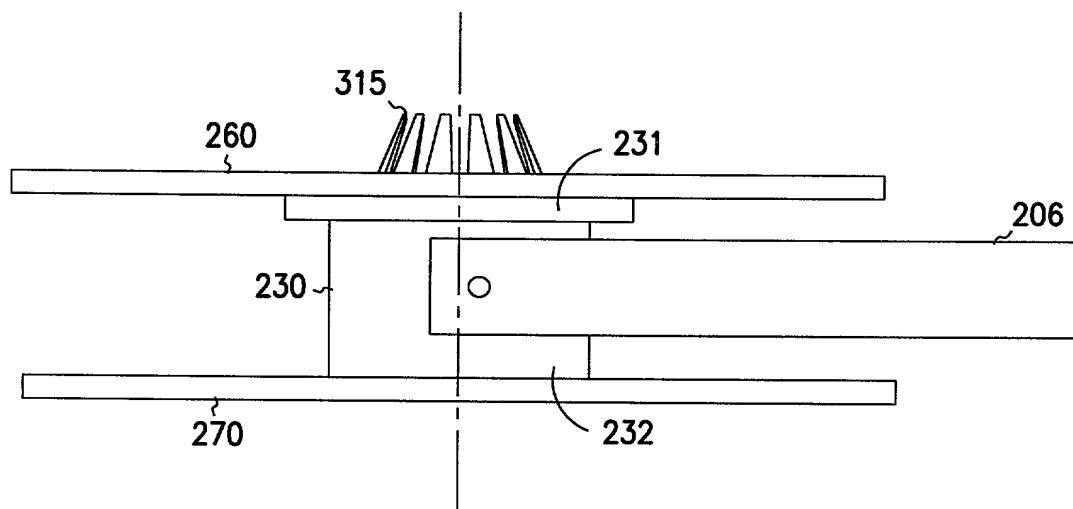


FIG. 4

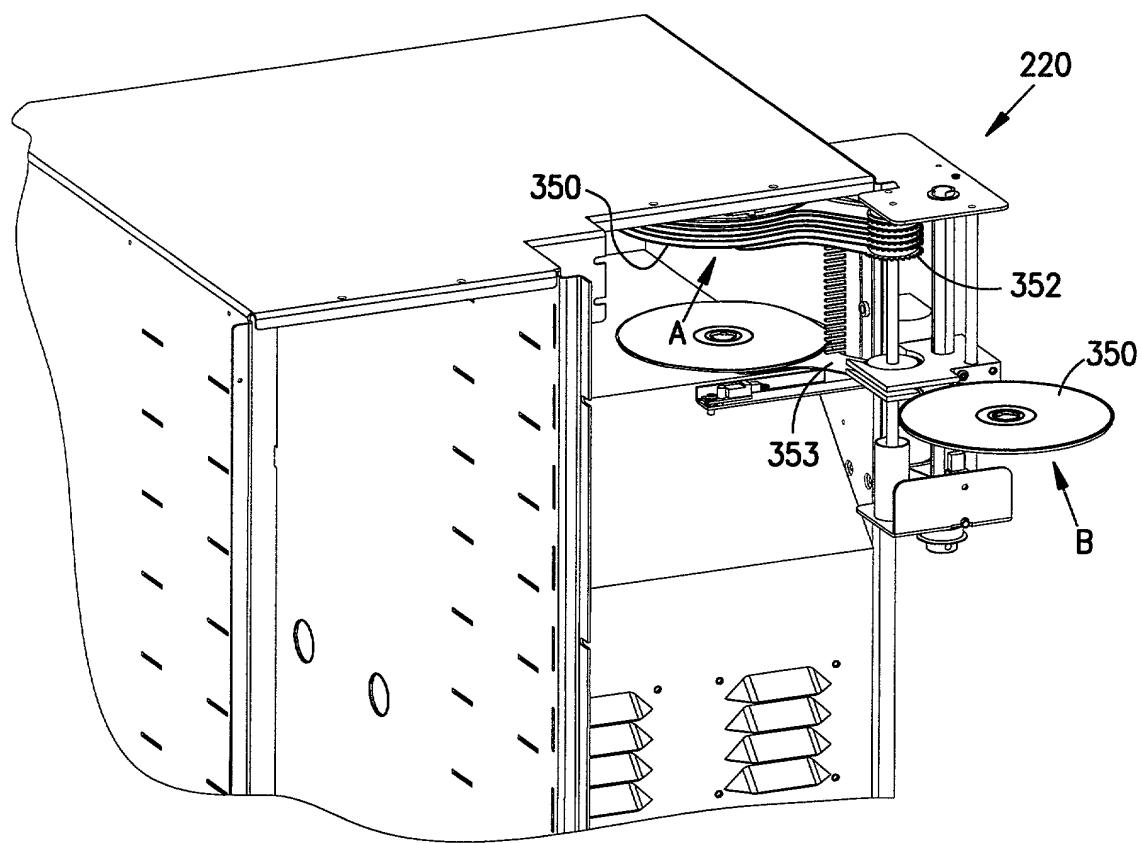


FIG. 5

FIG. 6

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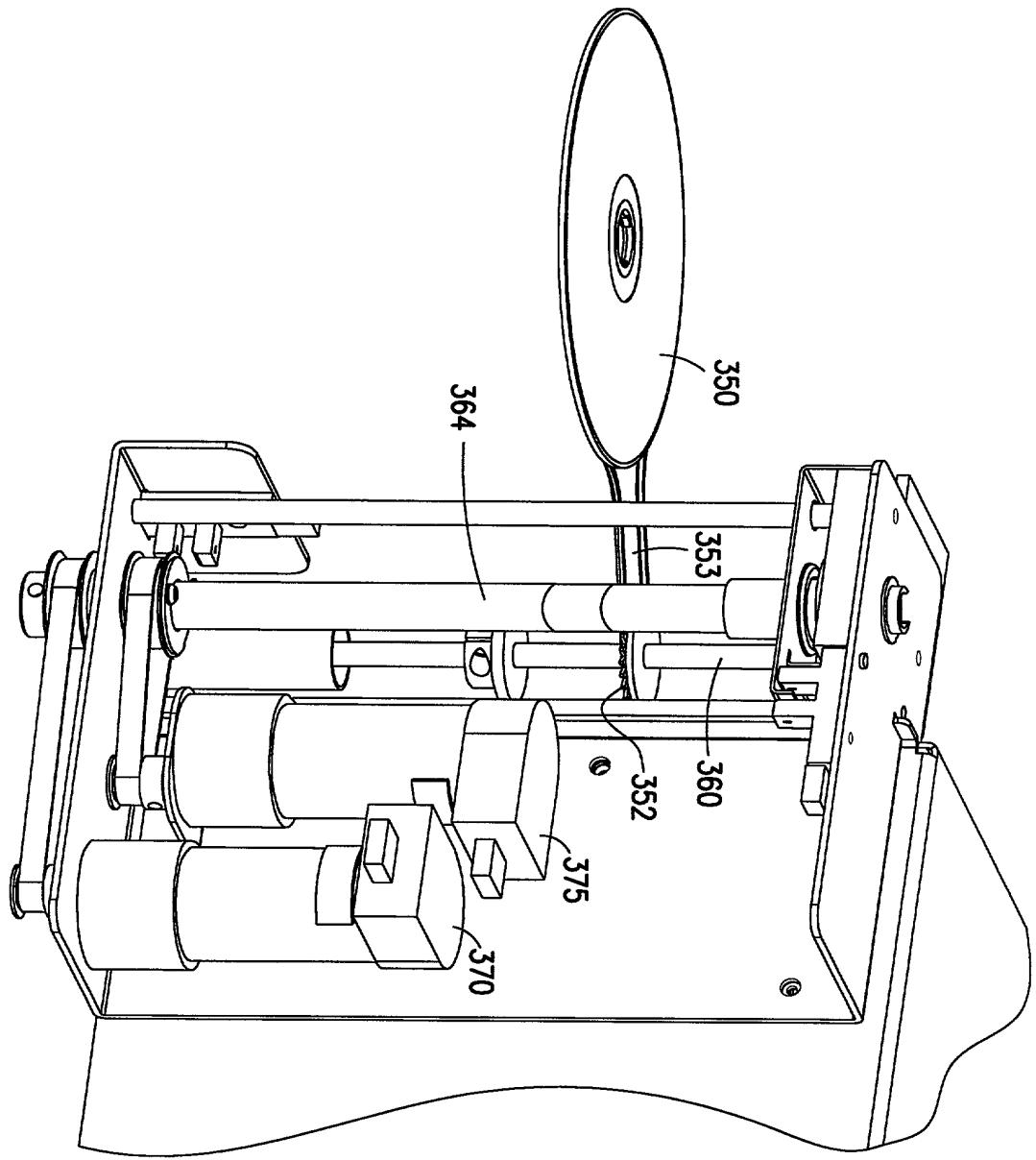
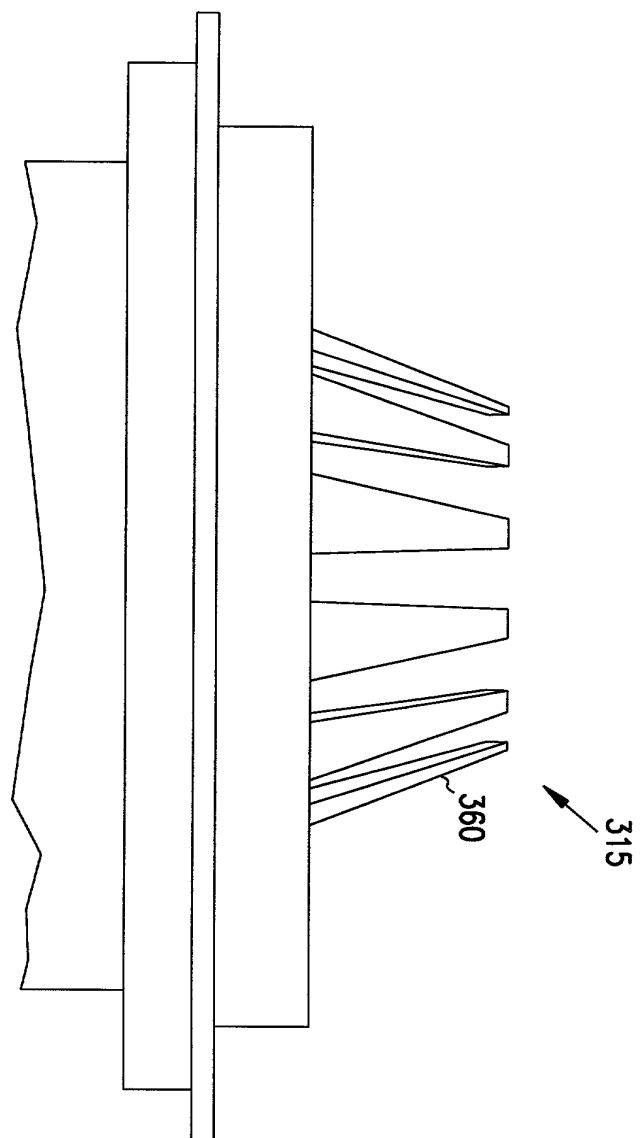


FIG. 7



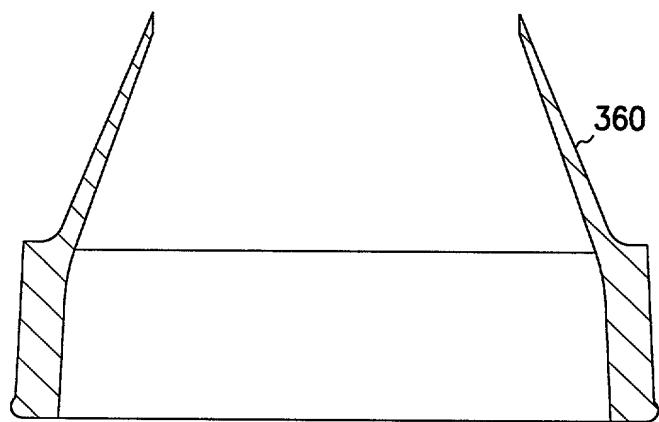


FIG. 8A

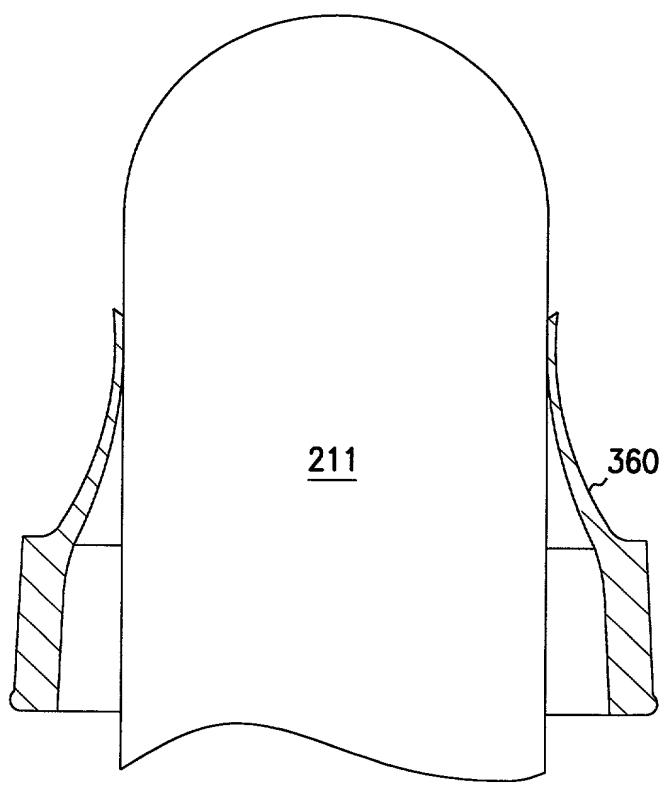


FIG. 8B

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.

United States Patent Application

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor I hereby declare that: my residence, post office address and citizenship are as stated below next to my name; that

I verily believe I am the original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled: **MEDIUM HANDLER AND ORGANIZER**.

The specification of which is attached hereto.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with 37 C.F.R. § 1.56 (attached hereto). I also acknowledge my duty to disclose all information known to be material to patentability which became available between a filing date of a prior application and the national or PCT international filing date in the event this is a Continuation-In-Part application in accordance with 37 C.F.R. § 1.63(e).

I hereby claim foreign priority benefits under 35 U.S.C. §119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on the basis of which priority is claimed:

No such claim for priority is being made at this time.

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below:

No such claim for priority is being made at this time.

I hereby claim the benefit under 35 U.S.C. § 120 or 365(c) of any United States and PCT international application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose material information as defined in 37 C.F.R. § 1.56(a) which became available between the filing date of the prior application and the national or PCT international filing date of this application:

No such claim for priority is being made at this time.

Attorney Docket No.: 510.030US1
 Serial No. not assigned
Filing Date: not assigned

Page 2 of 4

I hereby appoint the following attorney(s) and/or patent agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith:

Adams, Gregory J.	Reg. No. 44,494	Huebsch, Joseph C.	Reg. No. 42,673	Oh, Allen J.	Reg. No. 42,047
Anglin, J. Michael	Reg. No. 24,916	Jurkovich, Patti J.	Reg. No. 44,813	Padys, Danny J.	Reg. No. 35,635
Bentley, Dwayne L.	Reg. No. P-45,947	Kalis, Janal M.	Reg. No. 37,650	Parker, J. Kevin	Reg. No. 33,024
Bianchi, Timothy E.	Reg. No. 39,610	Kaufmann, John D.	Reg. No. 24,017	Peacock, Gregg A.	Reg. No. 45,001
Billion, Richard E.	Reg. No. 32,836	Klima-Silberg, Catherine I.	Reg. No. 40,052	Perdok, Monique M.	Reg. No. 42,989
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Brennan, Leoniede M.	Reg. No. 35,832	Lacy, Rodney L.	Reg. No. 41,136	Prout, William F.	Reg. No. 33,995
Brennan, Thomas F.	Reg. No. 35,075	Leffert, Thomas W.	Reg. No. 40,697	Schumm, Sherry W.	Reg. No. 39,422
Brooks, Edward J., III	Reg. No. 40,925	Lemaire, Charles A.	Reg. No. 36,198	Schwegman, Micheal L.	Reg. No. 25,816
Chu, Dinh C.P.	Reg. No. 41,676	Litman, Mark A.	Reg. No. 26,390	Shaw, Stephen H.	Reg. No. P-45,404
Clark, Barbara J.	Reg. No. 38,107	Lundberg, Steven W.	Reg. No. 30,568	Slifer, Russell D.	Reg. No. 39,838
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Eliseeva, Maria M.	Reg. No. 43,328	Malen, Peter L.	Reg. No. 44,894	Steffey, Charles E.	Reg. No. 25,179
Embretson, Janet E.	Reg. No. 39,665	Mates, Robert E.	Reg. No. 35,271	Terry, Kathleen R.	Reg. No. 31,884
Fogg, David N.	Reg. No. 35,138	McCrackin, Ann M.	Reg. No. 42,858	Tong, Viet V.	Reg. No. P-45,416
Fordenbacher, Paul J.	Reg. No. 42,546	Nama, Kash	Reg. No. 44,255	Viksnins, Ann S.	Reg. No. 37,748
Forrest, Bradley A.	Reg. No. 30,837	Nelson, Albin J.	Reg. No. 28,650	Woessner, Warren D.	Reg. No. 30,440
Harris, Robert J.	Reg. No. 37,346	Nielsen, Walter W.	Reg. No. 25,539		

I hereby authorize them to act and rely on instructions from and communicate directly with the person/assignee/attorney/firm/organization/who/which first sends/sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct Schwegman, Lundberg, Woessner & Kluth, P.A. to the contrary.

Please direct all correspondence in this case to **Schwegman, Lundberg, Woessner & Kluth, P.A.** at the address indicated below:

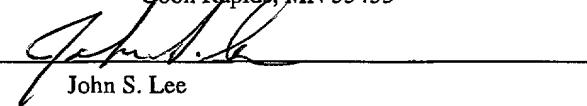
P.O. Box 2938, Minneapolis, MN 55402
Telephone No. (612)373-6900

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of joint inventor number 1 : John S. Lee

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Coon Rapids, MN 55433

Residence: Coon Rapids, MN

Signature: 

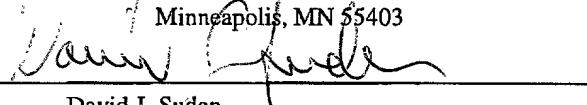
Date: 2-8-2000

John S. Lee

Full Name of joint inventor number 2 : David J. Suden

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 Post Office Address: 1717 Humbolt Avenue South
Minneapolis, MN 55403

Residence: Minneapolis, MN

Signature: 

Date: 2/07/2000

David J. Suden

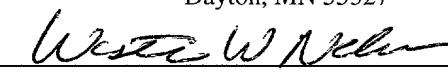
Additional inventors are being named on separately numbered sheets, attached hereto.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of joint inventor number 3 : **Westin W. Nelson**

Citizenship: **United States of America**
Post Office Address: 13890 Hemlock Lane
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Residence: **Dayton, MN**

Signature: 

Westin W. Nelson

Date: 2/4/00

Full Name of joint inventor number 4 : **Phillip C. Salisbury**

Citizenship: **United States of America**
Post Office Address: 7500 Winnetka Heights Drive
Golden Valley, MN 55427

Residence: **Golden Valley, MN**

Signature: 

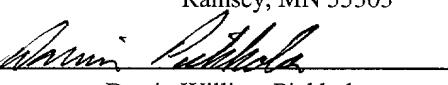
Phillip C. Salisbury

Date: 4-Feb-2000

Full Name of joint inventor number 5 : **Darrin William Piekola**

Citizenship: **United States of America**
Post Office Address: 5511 145th Ct. NW
Ramsey, MN 55303

Residence: **Ramsey, MN**

Signature: 

Darrin William Piekola

Date: 2-4-2000

Full Name of inventor:

Citizenship: _____ Residence:
Post Office Address: _____

Signature: _____

Date: _____

§ 1.56 Duty to disclose information material to patentability.

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is canceled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is canceled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§ 1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

- (1) prior art cited in search reports of a foreign patent office in a counterpart application, and
- (2) the closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.

(b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and

- (1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or
- (2) It refutes, or is inconsistent with, a position the applicant takes in:
 - (i) Opposing an argument of unpatentability relied on by the Office, or
 - (ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

- (c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:
- (1) Each inventor named in the application;
 - (2) Each attorney or agent who prepares or prosecutes the application; and
 - (3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.

(d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.